Name:

## at1118paper: Complete the Square (v401)

### Example

By completing the square, find both solutions to the given equation:

$$x^2 - 60x = -611$$

Add $\left(\frac{-60}{2}\right)^2$, which equals 900, to both sides of the equation.

$$x^2 - 60x + 900 = 289$$

Factor the left side.

$$(x - 30)^2 = 289$$

Undo the squaring. We need to consider both $\pm\sqrt{289}$.

$$x - 30 = -17 \quad \text{or} \quad x - 30 = 17$$
$$x = 13 \quad \text{or} \quad x = 47$$

### Question 1

By completing the square, find both solutions to the given equation:

$$x^2 - 34x = -120$$

$$x^2 - 34x + 289 = 169$$
$$(x - 17)^2 = 169$$
$$x - 17 = \pm 13$$
$$x = 4 \quad \text{or} \quad x = 30$$

### Question 2

By completing the square, find both solutions to the given equation:

$$x^2 + 6x = 616$$

$$x^2 + 6x + 9 = 625$$
$$(x + 3)^2 = 625$$
$$x + 3 = \pm 25$$
$$x = -28 \quad \text{or} \quad x = 22$$

## Question 3

By completing the square, find both solutions to the given equation:

$$x^2 + 30x = -176$$

$$x^2 + 30x + 225 = 49$$
$$(x + 15)^2 = 49$$
$$x + 15 = \pm 7$$
$$x = -22 \quad \text{or} \quad x = -8$$

## Question 4

By completing the square, find both solutions to the given equation:

$$x^2 + 38x = -105$$

$$x^2 + 38x + 361 = 256$$
$$(x + 19)^2 = 256$$
$$x + 19 = \pm 16$$
$$x = -35 \quad \text{or} \quad x = -3$$

## Question 5

By completing the square, find both solutions to the given equation:

$$x^2 + 24x = -63$$

$$x^2 + 24x + 144 = 81$$
$$(x + 12)^2 = 81$$
$$x + 12 = \pm 9$$
$$x = -21 \quad \text{or} \quad x = -3$$

## Question 6

By completing the square, find both solutions to the given equation:

$$x^2 + 22x = 203$$

$$x^2 + 22x + 121 = 324$$
$$(x + 11)^2 = 324$$
$$x + 11 = \pm 18$$
$$x = -29 \quad \text{or} \quad x = 7$$